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WORLD VIEW

Cataract blindness and visual outcome of cataract surgery in a tribal area in Pakistan

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Aim: To estimate the rates of cataract blindness and cataract surgical coverage and to assess the visual outcome of cataract surgery among individuals aged ⩾50 years in Orakzai Agency, Pakistan.

Methods: 1600 individuals aged ⩾50 years were selected using probability proportional to size sampling. The main outcome measure was bilateral cataract blindness which was defined as visual acuity of <3/60 in the better eye with best available correction and with obvious central lens opacities/absence of red reflex in both eyes.

Results: A total of 1549 people were examined; the coverage rate was 96.8%. Of individuals who were examined, 958 (61.8%) were men. The overall prevalence of bilateral cataract blindness was 4.8% (95% CI: 3.8% to 5.9%). Women had a 2.1-fold greater prevalence of bilateral cataract blindness than men (7.1% (5.0% to 9.2%) *v* 3.4% (2.3% to 4.6%); p = <0.0001). However, cataract surgical coverage rates were lower for women than men. The overall quality of previous cataract surgery was poor: 43.1% eyes with cataract surgery had VA <6/60. 73.3% people with bilateral cataract blindness reported they could not undergo cataract surgery because they were too poor to afford its cost.

Conclusion: The unacceptably high rates of cataract blindness and poor affordability and visual outcome of cataract surgery calls for the establishment, in the agency, of static cataract surgical services that are high quality, affordable, and gender sensitive.

Cataract remains the leading cause of blindness worldwide, accounting for nearly half (47.8% or 17.7 million) of all blindness cases.[1] About 85% of the world's cataract blind people live in developing countries where availability of or access to cataract services is poor. Where services are available, there are concerns that they are often of poor quality.[2] Pakistan, with a population of around 154 million people, is the sixth most populous country in the world and its population is expected to double by 2035. Cataract is a public health problem in the country. The National Blindness Prevalence Survey conducted during 1987–90 estimated that 1.78% people in Pakistan were blind (visual acuity in the better eye less than 3/60 with best correction), 66% of cases caused by cataract.[3] Although cataract services have grown substantially in Pakistan in past 10 years,[4] many parts of the country still do not have these services. One such area is the Orakzai Agency, one of the seven federally administered tribal areas, or agencies as they are called. The agencies (Bajaur, Mohmand, Orakzai, Khyber, Kurram, North Waziristan, and South Waziristan) in the mountainous region that flanks the country's border with Afghanistan, were created by the British colonialists as a buffer zone between the then undivided India and Afghanistan and thus still have a unique set of draconian laws called the Frontier Crimes Regulations (FCR). These laws were introduced by the British colonialists in 1901 to suppress resistance from the native Pakhtoons.[5] Pakistan's federal laws do not apply in the tribal region[6]; and residents of the agencies still don't have the right of political association. Spread over an area of 27 220 square kilometres, the trial area has a total population of around 3.2 million. But more than a century of lack of investment in human development means poor access to education (only 1% of the female population is able to read) and health, including cataract services. Orakzai Agency has a total population of 225 441 people. However, most of the surgeries performed are in eye camps, or in charity hospitals situated around several hundred kilometres away from the agency. Recently Pakistan Institute of Community Ophthalmology (PICO), Peshawar, Pakistan, with the assistance of Sight Savers International (SSI), planned to build an eye surgical unit at the agency headquarter hospital at Ghiljo. To provide baseline data for better planning of cataract services in Orakzai Agency, we conducted a study to estimate the rates of cataract blindness and cataract surgical coverage and to assess the visual outcome of cataract surgery among individuals aged ⩾50 years in the agency.

METHODS AND MATERIALS

According to Pakistan's population census of 1998, 27 052 (12%) of 225 441 people living in Orakzai Agency were aged ⩾50 years.[1] For calculation of sample size for cluster random sampling, we assumed the prevalence of bilateral cataract blindness in the agency to be 4% because of poor access to cataract services. We specified a precision level of plus or minus 30% of the expected prevalence (4.0%), a confidence level of 95% and a design effect of 1.5. We calculated a sample size of 1454 subjects and then adjusted it for a possible non-response rate of 10%. The number of subjects needed was 1600. We planned to select a total of 32 clusters, each of which consisted of 50 individuals.

A list of villages/settlements in the agency with their respective populations was generated. A column of the cumulative population of villages was added. Then a sample of 32 clusters was selected using probability proportional to the size of the population. More details of sampling methodology are provided in a manual developed by the World Health Organization.[7]

A team comprising an ophthalmologist and two ophthalmic technicians and two female health workers examined the

Abbreviations: CSC, cataract surgical coverage; IOL, intraocular lens; RACSS, Rapid Assessment of Cataract Surgical Services; VA, visual acuity

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Table 1 Age-sex distribution of individuals aged 50 years and older in Orakzai Agency, Pakistan (n = 1549)

Age group (years)	Male (n = 958)	Female (n = 591)	Total (n = 1549)
50–59	355 (37.1%)	293 (49.6%)	648 (41.8%)
60–69	495 (51.7%)	243 (41.1%)	738 (47.6%)
70–79	99 (10.3%)	41 (6.9%)	140 (9.0%)
⩾80	9 (0.9%)	14 (2.4%)	23 (1.5%)

Table 2 Prevalence of bilateral cataract blindness among individuals aged 50 years and older in Orakzai Agency, Pakistan

Age group (years)	Men	Cataract blind (%)	Women	Cataract blind (%)	All	Cataract blind (%)
50–59	355	1 (0.3)	293	0 (0.0)	648	1 (0.2)
60–69	495	15 (3.0)	243	21 (8.6)	738	36 (4.9)
70–79	99	16 (16.2)	41	15 (36.6)	140	31 (22.1)
⩾80	9	1 (11.1)	14	7 (50.0)	23	8 (34.8)
Total	958	33 (3.4)	591	42 (7.1)	1549	75 (4.8)

subjects. Female staff were included to examine females in order to reduce the likelihood that females would refuse to be examined. A total of 50 people aged ⩾50 years (a cluster) were examined each day. They were notified a day before the scheduled examination. If an eligible person could not be examined despite three house visits, information about his/her visual status was collected from his/her relatives/neighbours. A proforma, which had been used in many rapid assessments of cataract surgical services in several countries, was used to collect data on age, sex, visual acuity, lens status, barriers to the uptake of cataract surgery, and place and outcome of previous cataract surgery.

The detailed methodology of Rapid Assessment of Cataract Surgical Services (RACSS) has been described elsewhere.[8–15] Briefly, visual acuity was measured at each household in full daylight using the tumbling ''E'' card. Individuals having visual acuity (VA) <3/60 in either eye with best available correction were referred to the ophthalmologist for a detailed assessment in a central examination site in each cluster. Lens examination of the subject with VA <3/60 in the better eye with best available correction, was performed by the ophthalmologist. Lens status (normal, cataract, aphakia, pseudophakia, or could not be viewed) was assessed by distant direct ophthalmoscopy with undilated pupil in the dark. Our main outcome measure was bilateral cataract blindness, which was defined as visual acuity of <3/60 in the better eye with best available correction and with obvious central lens opacities/absence of red reflex in both eyes. Individuals found bilaterally blind due to cataract were asked to identify the reason that they had not been operated so far. Data entry and analysis were done using a special RACSS software.[7] Cataract surgical coverage (CSC) for people was calculated using the following formula: CSC (people) = (x + y/x + y + z) × 100, where x = number of people with (pseudo)aphakia in one eye and operable cataract in the other; y = number of people with bilateral (pseudo)aphakia; and *z* = number of people with bilateral operable cataract. CSC for eyes was calculated using the following formula: CSC (eyes) = (a/a + b) × 100, where a = number of (pseudo)aphakic eyes and b = number of eyes with operable cataract.

Table 3 Cataract surgical coverage (CSC) for people and for eyes among individuals aged 50 years and older in Orakzai Agency, Pakistan

Sex	Individuals examined	CSC for person	CSC for eyes
Male	958	68.9%	49.5%
Female	591	51.6%	41.3%
Total	1549	60.9%	46.0%

RESULTS

Sixteen hundred people aged ⩾50 years were eligible to be examined. Fifty one individuals were absent. Of 1549 individuals who were present, no one refused the examination. Of these, 958 (61.8%) were men and 591 (38.2%) women (table 1). The prevalence of bilateral blindness was 5.9% (95% CI: 4.7% to 7.0%) and that of bilateral cataract blindness was 4.8% (95% CI: 3.8% to 5.9%); 82.4% (75/91) of all blind cases were caused by cataract. Women had a 2.1-fold greater prevalence of cataract blindness than men (7.1% (5.0 to 9.2) *v* 3.4% (2.3 to 4.6); p = <0.0001) (table 2). The overall prevalence of unilateral blindness caused by cataract was 6.8% (95% CI: 5.5% to 8.1%) to 7.5% (95% CI: 5.8% to 9.2%) among men and 5.8% (95% CI: 3.9% to 7.6%) among women. Overall, women had a higher burden of cataract blind eyes compared with men (10.0% (118/1182) *v* 7.2% (138/1916)). The CSC for people with bilateral cataract blindness (VA <3/60) was 60.9%–68.9% for men *v* 51.6% for women, while the cataract surgical coverage for eyes was 46.0%–49.5% for men's eyes and 41.3% for women' eyes (table 3). A total of 75

Table 4 Self reported barriers to cataract surgery among individuals with bilateral cataract blindness (n = 75) in Orakzai Agency, Pakistan

Primary barrier	Number (%)
Cost of surgery	55 (73.3)
Cataract is not yet mature	8 (10.7)
Fear of surgery	5 (6.7)
Need not felt	5 (6.7)
Unawareness of cataract	1 (1.3)
No one to accompany	1 (1.3)

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Table 5 Prevalence of pseudophakia/aphakia among individuals aged 50 years and older in Orakzai Agency, Pakistan

Age group (years)	Eyes, men	Pseudophakic/ aphakic eyes (%)	Eyes, women	Pseudophakic/ aphakic eyes (%)	All	Pseudophakic/ aphakic eyes (%)
50–59	710	4 (0.6)	586	6 (1.0)	1296	10 (0.8)
60–69	990	72 (7.3)	486	56 (11.5)	1476	128 (8.7)
70–79	198	51 (25.8)	82	14 (17.1)	280	65 (23.2)
⩾80	18	8 (44.4)	28	7 (25.0	46	15 (32.6)
Total	1916	135 (7.0)	1182	83 (7.0)	3098	218 (7.0)

individuals had bilateral cataract blindness. The majority (73.3%) of them said they had not been operated so far because they could not afford the cost of surgery (table 4). Other reasons included ''cataract is not yet mature (10.7%),'' fear of surgery (6.7%), ''old age, need not felt (6.7%).''

Two hundred and eighteen cataract surgeries had been performed on the selected subjects; 135 surgeries (61.9%) were on men (table 5). They had been performed in charity hospitals (49.5%), eye camps (38.1%), public hospitals (4.1%), and private hospitals (0.9%). A total of 133 (61.0%) surgeries were on men. The overall quality of previous cataract surgery in the agency was poor (table 6). Only 5.5% had a good outcome (6/6–6/18) while 51.4% and 43.1% had borderline (<6/18–6/60) and poor (<6/60) outcomes, respectively. Although the majority of surgeries (121/218 or 55.5%) were non-intraocular lens (IOL), they were more likely to be associated with poorer outcome compared with IOL surgery. In non-IOL surgeries, 0%, 33.1%, and 66.9% were in good, borderline, and poor categories, respectively. In the IOL group, 12.4%, 74.2%, and 13.4% were in the good, borderline, and poor categories, respectively.

DISCUSSION

This study highlights the high prevalence of cataract blindness as a result of lack of cataract surgery services in one of the most underdeveloped areas of Pakistan. It also highlights the poor outcome of cataract surgery that is offered to the residents of the agency in camps or hospitals elsewhere.

The prevalence of bilateral cataract blindness (VA <3/60) among people aged ⩾50 years was 4.8% (95% CI: 3.8% to 5.9%), which is one of the highest reported in recent studies conducted in Pakistan as well as elsewhere. For example, studies conducted in Chakwal and Malakand districts in Pakistan reported a prevalence of bilateral cataract blindness of 2.0% (95% CI: 1.2% to 3.2%), and 2.6% (95% CI:1.6% to 3.6%), respectively.[13 15] But the high prevalence of cataract blindness in this study was not unexpected, keeping in view lack of static cataract surgical services and decades of underdevelopment, poverty, and deprivation in the area. The areas are mountainous and sparsely populated. Farming, which is a way of living for the majority of people in the area, is rain fed, which means they may be too poor to pay for cataract surgery. This is supported by our finding that 73.3% of subjects with bilateral cataract blindness reported they could not undergo cataract surgery because they could not afford its cost. This proportion is worryingly high compared with that found in Lower Dir, Pakistan (38%),[13] Chakwal, Pakistan (18%),[15] Karnataka, India (4.4%),[16] and Katsina, Nigeria (61%).[17] Thus, our study calls for the establishment of a cataract service that take into account its affordability by those in need.

Women had a twofold higher prevalence of cataract blindness than men—a finding which is consistent with those of many previous studies. An estimated two thirds of all cataract blindness worldwide occur in women. Cost is a key barrier to use of cataract surgical services for women, but women with cataract blindness compared with men may be less likely to travel to other cities/areas to utilise cataract services provided free of cost. Our study suggests that the cataract surgical coverage for people as well as for eyes was substantially lower in women than in men.

Another disturbing finding of our study was the low ratio of women to men (60 to 100) which is much lower than reported for rest of Pakistan (92.2 to 100). To our knowledge such enormous variations have not been reported previously, and they cannot be due to chance alone. There are obvious reasons for the ''missing women'': higher infant and children mortality among girls than boys because of differential access to health care; and high levels of maternal mortality in child bearing age. According to the most recent census, the female literary rate in women in Orakzai Agency is only 0.7% compared with 4.7% in males.

The WHO suggests that 85% of eyes undergoing cataract surgery should have good outcome (6/6–6/18), 10% have borderline outcome (<6/18–6/60), while less than 5% have poor outcome (<6/60).[18] However, in our study only 5.5% had a good outcome, while 51.4% and 43.1% had a borderline and poor outcome, respectively. Similar results of poor outcome have also been found in population based studies in Lower

Table 6 Outcome of cataract surgery as assessed among individuals aged 50 years and older in Orakzai Agency, Pakistan

Variable	Number of surgeries	Good* 6/6–6/18	Borderline <6/18–6/60	Poor <6/60
Duration since cataract surgery				
<1 year	38	13.2%	57.9%	28.9%
⩾1–5 years	150	4.7%	50.7%	44.6%
6–10 years	25	–	56.0%	44.0%
>10 year	5	–	–	100%
Type of surgery				
IOL surgery	97	12.4%	74.2%	13.4%
Non-IOL surgery	121	0.0%	33.1%	66.9%
Total	218	5.5%	51.4%	43.1%

*The findings shown are of visual acuity with best available correction.

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Dir, Pakistan (37.3%), Chakwal, Pakistan (32.2%), Nepal (21%), China (39%), Karnataka and Gujarat, India (24–26%),[19] and Rajasthan, India (45%). Visual outcome was better with IOL implantation than without it, as has been observed in many other studies. Outcome of surgeries performed during the year preceding the eye examination was better compared with those conducted 1–5 years, 5–10 years, or more than 10 years ago. We believe that outcome of cataract surgery in the agency could be brought to WHO recommended levels if efforts are made to provide good supervised training to cataract surgeons, perform surgery with IOL, improve case selection and postoperative follow up, and provide corrective glasses if needed.

A limitation of our analysis is that the prevalence of bilateral cataract blindness we calculated could not be adjusted for age and sex because information on the female population and their age distribution for Orakzai Agency are unavailable. The Pakistan population census of 1998 collected data of the male population of the agency alone.

The unacceptably high rates of cataract blindness, and poor affordability and visual outcome of cataract surgery calls for the establishment, in the agency, of static cataract surgical services that are high quality, affordable, and gender sensitive.

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